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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/631,623	08/04/2000	Yukihiro Nagai	50090-233	2307

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EXAMINER

KANG, DONGHEE

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 06/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/631,623

Applicant(s)

NAGAI ET AL.

Examiner

Donghee Kang

Art Unit

2811



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
 - Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6 and 7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6 and 7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgment

1. Applicant's Amendment Response to Paper No.3 has been entered and made of Record. Claim 5 has been cancelled. Thus claims 1-4 & 6-7 are pending in this Office Action.

Information Disclosure Statement

2. Acknowledgment is made of receipt of applicant's Information Disclosure Statement (PTO-1449) filed 6 February 2002, 2000.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "having different thickness in claim 2 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 2 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not support the limitation "*a plurality of surface insulating films, having different thickness, formed ..a surface of the active regions in the first portion and on the interior surface of said at least one trench in the second portion...*" in lines 1-3.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1 & 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claim 1, lines 10-12 -- the phrase "the surface insulating film is sufficiently thin to function as an electric fuse" is unclear. This interpretation seems to be consistent with Figure 8, for example, where the surface insulating film 16 is formed on a surface of active region in the first portion, a memory cell section (A) and a peripheral circuit section (B), and on the interior surface of trench in the second portion, an electric fuse section (C). The scope of what is being claimed does not sufficiently describe the structural relationship of the surface insulating film formed in the first portion with respect to the surface insulating film formed in the second portion. In the first portion, the surface insulating film does not act as a fuse.

Claim 3 recites the limitation "the plurality of insulating films and the plurality of conductive films" in lines 8-9. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 4 & 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 5,629,227).

Regarding claim 1, Chen teaches a semiconductor device comprising (Fig.3):
a semiconductor substrate; a first portion comprising ESD protection device formed in the semiconductor substrate; a second section comprising trench having an interior surface; a surface insulating film (26) formed on a surface of the ESD protection device in the first portion and on the interior surface of said trench in the second portion; and a conductive film (29) formed on the surface insulating film.

Chen does not explicitly teach plurality active devices and plurality active isolation regions. However, it is well known in the art that plurality active devices are incorporated on a chip with an antifuse. Thus, it would have been obvious in the art at the time to form plurality active devices, such as transistor and capacitor etc., and isolation regions in VLSI ICs in order to determine an electrical characteristics of an antifuse.

Regarding claim 4, Chen teaches a semiconductor device comprising (Fig.3):
a semiconductor substrate; at least a trench formed in the semiconductor substrate; a surface insulating film (26) formed along a surface of the trench of the semiconductor substrate; and a conductive film (29) formed on the surface insulating film, wherein the surface insulating film is broken down for forming an electric fuse. Although, Chen does not explicitly teach the surface insulating film is sufficiently thin to be broken down, this feature is inherent because the surface insulating film of Chen functions as a electric fuse.

Regarding claim 6, Chen teaches a plurality of trench is formed adjacently, and a surface insulating film and a conductive film are formed in each trench.

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Nguyen (US 5,682,049).

Chen teaches substantially the entire claimed invention, as applied to claim 1 above, except that the insulating film, which is formed on the interior surface of trench has a smaller thickness than other insulating film. However, it is well known in the art and also taught by Nguyen forming in Fig.2 the antifuse insulating film has a smaller thickness than gate insulating film. Thus it would have been obvious in the art at the time the invention was made to make the antifuse insulating film sufficiently thin in order to broke down when applied low electric field while other insulating film does not broke down.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Hause et al (US 6,140,674).

Chen teaches substantially the entire claimed invention, as applied to claim 4 above, except that an insulating film is embedded in a selected one of trenches. However it is well known in the art and also taught by Hause filling the trench with the insulating film in order to provide a separation region in the ICs device.

Response to Arguments

12. Applicant's arguments with respect to claims 1-4 & 6-7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-

9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Donghee Kang, Ph.D.
June 3, 2002

Steven Loko
Primary Examiner

